# CLAIMS

1. An obstacle detection device to be mounted on a vehicle for detecting and displaying an obstacle in a vicinity of the vehicle, the device comprising:

an obstacle detection section for emitting beams having a predetermined divergence angle consecutively in a plurality of different directions, receiving a reflected wave from an obstacle for each direction, and detecting the obstacle existing within an emission angle range of the beam for the direction;

a distance calculation section for calculating a distance representative of an interspace between the obstacle and the vehicle for each direction based on a received signal of the reflected wave for the direction outputted from the obstacle detection section;

an obstacle image creation section for creating, as an obstacle image, a figure two-dimensionally developed in the emission angle range of the beam emitted in each direction while treating, as a basis for image creation, the distance calculated by the distance calculation section for the direction, and for creating and outputting image data for displaying the obstacle image; and

a display section for receiving the image data created by the obstacle image creation section and displaying an image showing a positional relationship between the obstacle and the vehicle.

2. The obstacle detection device according to claim 1, wherein, within a range of obstacle presence indicated by the received signal of the reflected wave outputted from the obstacle detection section, the distance calculation section calculates an average distance as seen from an emission point of the beam.

3. The obstacle detection device according to claim 2, wherein the distance calculation section comprises:

a threshold value discriminating section for detecting a portion of the received signal of the reflected wave outputted from the obstacle detection section in which an amplitude thereof exceeds a predetermined threshold value; and

a representative distance calculation section for detecting a start time and an end time of the portion of the received signal detected by the threshold value discriminating section, obtaining a length of time that elapses since the beam is emitted until a time obtained by subjecting the detected start time and end time to simple averaging, and calculating a representative distance between the obstacle and the vehicle based on the obtained elapsed time.

4. The obstacle detection device according to claim 1, wherein, within a range of obstacle presence indicated by the received signal of the reflected wave outputted from the obstacle detection section, the distance calculation section calculates a shortest distance as seen from an emission point of the beam.

5. The obstacle detection device according to claim 4, wherein

the distance calculation section comprises:

a threshold value discriminating section for detecting a portion of the received signal of the reflected wave outputted from the obstacle detection section in which an amplitude thereof exceeds a predetermined threshold value; and

a representative distance calculation section for detecting a start time and an end time of the portion of the received signal detected by the threshold value discriminating section, obtaining a length of time that elapses since the beam is emitted until the detected start time, and calculating a representative distance between the obstacle and the vehicle based on the obtained elapsed time.

6. The obstacle detection device according to claim 1, wherein in the emission angle range of the beam emitted in each direction, the obstacle image creation section creates, as the obstacle image, an arc figure whose center is an emission point of the beam and whose radius is a distance calculated by the distance calculation section for the corresponding direction.

7. The obstacle detection device according to claim 6, wherein the obstacle image creation section changes thickness of the arc figure as the obstacle image created for each direction, in accordance with the distance calculated by the distance calculation section.

8. The obstacle detection device according to claim 1, wherein in the emission angle range of the beam emitted in each direction,

the obstacle image creation section creates, as the obstacle image, a figure having an area and at least containing an arc figure drawn to have an emission point of the beam for a center and a distance calculated by the distance calculation section for the corresponding direction for a radius.

9. The obstacle detection device according to claim 8, wherein the obstacle image created by the obstacle image creation section is an elliptical figure, end points of whose major axis coincide with end points of the arc locus.

10. The obstacle detection device according to claim 8, wherein the obstacle image creation section changes brightness of an entire figure as the obstacle image created for each direction, in accordance with the distance calculated by the distance calculation section.

11. The obstacle detection device according to claim 8, wherein,

while treating as a base figure the figure having an area created for each direction, the obstacle image creation section further determines as the obstacle image an entire figure obtained by joining all base figures in order of direction with line segments joining end points on one side of the arc loci contained in base figures in mutually adjacent directions and with line segments joining end points on the other side; and

an inside of the entire figure is divided based on the distance from the emission point of the beam, and the image data is created such that brightness of parts obtained by division is gradually

changed.

12. The obstacle detection device according to claim 6, wherein the obstacle image creation section further treats, as a representative location of the obstacle for each direction, a point apart from the emission point of the beam by the distance calculated by the distance calculation section for the direction, the point being in a central direction of the emission angle range of the beam emitted in the direction, and creates image data of a kinked line joining the reference locations in order of direction.